

What is claimed is:

1. A method of degrading a filter cake comprising an acid-soluble portion and a polymeric portion in a subterranean formation comprising the steps of:

introducing a filter cake degradation composition comprising a delayed-release acid component and a delayed-release oxidizer component to a well bore penetrating the subterranean formation;

allowing the delayed-release acid component to release an acid derivative and the delayed-release oxidizer component to release an acid-consuming component;

allowing the acid-consuming component to interact with the acid derivative to delay a reaction between at least a portion of the acid derivative and at least a portion of the acid-soluble portion of the filter cake and to produce hydrogen peroxide;

allowing the acid derivative to degrade at least a portion of the acid-soluble portion of the filter cake after a delay period; and

allowing the hydrogen peroxide to degrade at least a portion of the polymeric portion of the filter cake.

2. The method of claim 1 wherein the acid-soluble portion of the filter cake comprises calcium carbonate, a chemically bonded ceramic bridging agent, or a magnesium compound.

3. The method of claim 1 wherein the polymeric portion of the filter cake comprises a polysaccharide or a derivative thereof.

4. The method of claim 1 wherein the acid-consuming component comprises a peroxide.

5. The method of claim 1 wherein the acid-consuming component comprises ZnO_2 , CaO_2 , or MgO_2 .

6. The method of claim 1 wherein the delayed-release oxidizer component comprises calcium oxide, zinc oxide, magnesium oxide, zinc hydroxide, calcium hydroxide, magnesium hydroxide, urea, a urease enzyme, or a combination thereof.

7. The method of claim 1 wherein the delayed-release oxidizer component comprises about 0.1% to about 4% of the filter cake degradation composition.

8. The method of claim 1 wherein the delayed-release oxidizer component comprises about 0.2% to about 1% of the filter cake degradation composition.

9. The method of claim 1 wherein at least a portion of the delayed-release oxidizer component is encapsulated by an encapsulating coating.

10. The method of claim 1 wherein the delayed-release oxidizer component comprises encapsulated ZnO₂ particulates, encapsulated CaO₂ particulates, or encapsulated MgO₂ particulates.

11. The method of claim 9 wherein the encapsulating coating comprises a partially hydrolyzed acrylic resin or a degradable polymeric material.

12. The method of claim 9 wherein the encapsulating coating is present in an amount from about 10% to about 50% by weight of the encapsulated delayed-release oxidizer component.

13. The method of claim 9 wherein the encapsulating coating is present in an amount from about 20% to about 40% by weight of the encapsulated delayed-release oxidizer component.

14. The method of claim 9 wherein the encapsulated particulates have a specific gravity of at least about 2.

15. The method of claim 1 wherein the filter cake degradation composition is present in a gravel pack fluid.

16. The method of claim 15 wherein the delayed-release oxidizer component may be present in an amount of from about 0.1 to in excess of 50 pounds per 1,000 gallons of the gravel pack fluid.

17. The method of claim 15 wherein the gravel pack fluid comprises an aqueous-based fluid and a particulate material.

18. The method of claim 15 wherein the particulate material comprises natural sand, quartz sand, particulate garnet, glass, ground walnut hulls, nylon pellets, bauxite, ceramics, or polymeric materials.

19. The method of claim 1 wherein the delayed-release acid component comprises an ortho ester, poly(ortho ester); aliphatic polyester; lactide; poly(lactide); glycolide; poly(glycolide); lactone; poly(ε-caprolactone); poly(hydroxybutyrate); anhydride; poly(anhydride); or a poly(amino acid).

20. The method of claim 1 wherein the delayed-release acid component comprises an esterase enzyme.

21. The method of claim 1 wherein the delayed-release acid component comprises a poly(lactic acid) and an ortho ester.
22. The method of claim 1 wherein the filter cake is formed from a drill-in fluid.
23. The method of claim 1 wherein the delayed-release acid component is included in the filter cake degradation composition in an amount sufficient to react with the acid-consuming component of the delayed-release oxidizer component and then interact with the acid-soluble portion of the filter cake so as to degrade at least a portion of the acid-soluble portion of the filter cake.
24. The method of claim 1 wherein the delayed-release acid component is present in the filter cake degradation composition in an amount from about 1% to about 40% of the composition.
25. The method of claim 1 wherein the delayed-release acid component is present in the filter cake degradation composition in an amount from about 5% to about 20% of the composition.

26. A filter cake degradation composition comprising a delayed-release oxidizer component that will release an acid-consuming component and a delayed-release acid component that will release an acid derivative.

27. The composition of claim 26 wherein the acid-consuming component comprises a peroxide.

28. The composition of claim 26 wherein the acid-consuming component comprises ZnO₂, CaO₂, or MgO₂.

29. The composition of claim 26 wherein the delayed-release oxidizer component comprises calcium oxide, zinc oxide, magnesium oxide, zinc hydroxide, calcium hydroxide, magnesium hydroxide, urea, a urease enzyme, or a combination thereof.

30. The composition of claim 26 wherein the delayed-release oxidizer component comprises about 0.1% to about 4% of the filter cake degradation composition.

31. The composition of claim 26 wherein the delayed-release oxidizer component comprises about 0.2% to about 1% of the filter cake degradation composition.

32. The composition of claim 26 wherein at least a portion of the delayed-release oxidizer component is encapsulated by an encapsulating coating.

33. The composition of claim 26 wherein the delayed-release oxidizer component comprises encapsulated ZnO₂ particulates, encapsulated CaO₂ particulates, encapsulated MgO₂ particulates, or a mixture thereof.

34. The composition of claim 32 wherein the encapsulating coating comprises a partially hydrolyzed acrylic resin or a degradable polymeric material.

35. The composition of claim 32 wherein the encapsulating coating is present in an amount from about 10% to about 50% by weight of the encapsulated delayed-release oxidizer component.

36. The composition of claim 32 wherein the encapsulating coating is present in an amount from about 20% to about 40% by weight of the encapsulated delayed-release oxidizer component.

37. The composition of claim 32 wherein the encapsulated particulates have a specific gravity of at least about 2.

38. The composition of claim 26 wherein the delayed-release acid component comprises an ortho ester, poly(ortho ester); aliphatic polyester; lactide; poly(lactide); glycolide; poly(glycolide); lactone; poly(ϵ -caprolactone); poly(hydroxybutyrate); anhydride; poly(anhydride); or a poly(amino acid).

39. The composition of claim 26 wherein the delayed-release acid component comprises an esterase enzyme.

40. The composition of claim 26 wherein the delayed-release acid component comprises a poly(lactic acid) and an ortho ester.

41. The composition of claim 26 wherein the delayed-release acid component is included in the filter cake degradation composition in an amount sufficient to react with the acid-consuming component of the delayed-release oxidizer component and then interact with an acid-soluble portion of a filter cake so as to degrade at least a portion of the acid-soluble portion of the filter cake.

42. The composition of claim 26 wherein the delayed-release acid component is present in the filter cake degradation composition in an amount from about 1% to about 40% of the composition.

43. The composition of claim 26 wherein the delayed-release acid component is present in the filter cake degradation composition in an amount from about 5% to about 20% of the composition.